A different route to health: implications of transport policies

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Travel—how, where, and how often we do it—has major implications for the health of individuals and of the population.[1] Transport activities impact on health, both negatively and positively; and transport policies are now a key determinant of health. Health has to be included on the transport policy agenda if gains are to be achieved, and health professionals have a key role in this. In this article on the implications of transport policies, I draw on an extensive review to which many experts contributed and which will soon be published as a book by the World Health Organisation. I also draw on the preparatory work for the charter on transport, environment, and health[2] which was adopted at the ministerial conference on environment and health held in London this week.

Summary points

- Transport policies have important health consequences through their effects on air pollution, noise, injuries, climatic change, and their ability to create (or not) safe conditions for walking and cycling
- These health consequences affect most of the population, not just transport users
- Estimates of the health impacts and costs of transport strategies do not include the health effects of increased walking and cycling and the savings associated with increased walking and cycling for a population
- The burden of transport on health is higher than expected, partly because users do not pay the full costs of the transport activities they engage in
- The public and policy makers need to be informed about the health consequences of individual travel choices and of policies on transport and land use planning
- Health professionals have a key role in providing this information and assessing the health impacts of transport policies

Health impacts

Physical activity

Cycling or walking can bring major health benefits—half an hour a day can halve the risk of developing heart disease. This is equivalent to the effect of not smoking and is valid for most of the population, who do very little physical activity. Even if spread over two or three shorter episodes, this amount of activity can also halve the risk of developing diabetes, reduce blood pressure (equivalent to the effect of taking antihypertensive drugs), and improve functional capacity.[3 4] Over half of the daily trips that people make are short and provide an opportunity for physical activity that is free and accessible.

The benefits of cycling and walking as a means of transport have been largely overlooked. Studies of the economics of transport have not considered them in their calculations.[5] Furthermore, health workers have focused on physical activity as leisure and individual behavioural change.

The risk of accidents is an important deterrent to cycling. However, life table analyses of the risk of accidents and the cardiovascular benefits of cycling for people living in the United Kingdom showed a net benefit of several fold for this exercise.[6] But this benefit would not hold if the risk of road accidents was much greater. Safe conditions for walking and cycling are therefore part and parcel of their promotion.

Accidents and injuries

Society still seems to accept a disturbingly high level of risk in relation to motor transport. Around 120 000 people die as a result of motor vehicle accidents every year in the 51 countries of the World Health Organisation's European region. In absolute numbers and after adjustment for miles travelled, most deaths associated with transport occur on the road (as opposed to trains, aeroplanes, or ships), and a third of road deaths occur in people aged less than 25 years.[7 8]

Differences across European countries in implementing and enforcing interventions to reduce well known accident risk factors are shown by the eightfold variation in traffic injury mortality (both per 100 000 population and per billion passenger kilometres). Speed has a dramatic impact on the frequency and severity of and mortality from road accidents. A 1% reduction in speed results in a 3% reduction in accident frequency. For example, 5% of pedestrians will die if hit by a vehicle travelling at 20 miles/h (32 km/h), 45% if hit at 30 miles/h (48 km/h), and 85% will die if hit at 40 miles/h (64 km/h).[9] Similarly, shared road use by motor vehicles, pedestrians, and cyclists increases the risk of a traffic injury among walkers and cyclists.

Climatic change

Road traffic contributes to climatic change. It accounts for a substantial share of CO_2 emissions to the stratosphere (25% in European Union countries) and is therefore directly responsible for some of the global changes in the environment. These changes are predicted to have important health consequences that extend far beyond the location of the traffic.[10]

Air pollutants

Current exposure to air pollutants found in European countries has serious effects on health.[11] Particulate matter is a good indicator of the air pollution mix that people are exposed to and has been associated with short term and long term increases in mortality.

It is estimated that a change in air pollution from the highest to the lowest amounts documented in studies in the United States of the long term effects of air pollution (particulate matter smaller than 2.5 μm around 30 μg/m^3 of air and 10 μg/m^3 of air) could conceivably be associated with a change in life expectancy in the order of years.[12] Another estimate suggests that Dutch men could gain over a year in life expectancy from a reduction in the concentration of particulate matter smaller than 2.5 μm to around 10 μg/m^3 of air.[13]

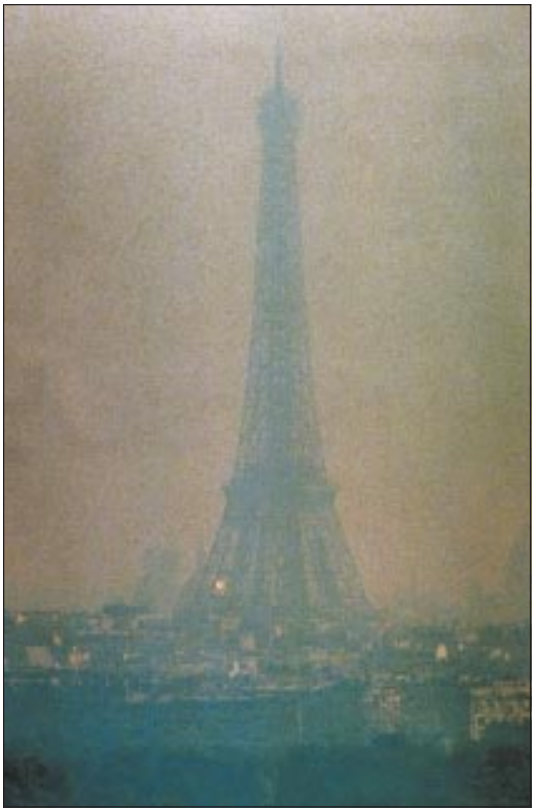
Particulate matter is also associated with increases in respiratory symptoms, greater use of drug treatments in people with asthma, reduction in lung function, and admissions to hospital for respiratory and cardiovascular disease. No threshold could be identified below which health effects were not found. In northern Europe, about 40% of particulate matter comes from traffic. Small particles can get indoors freely and can travel long distances, so neither the indoor environment nor distance from roads offers much protection.

Ozone seems to have an independent effect on respiratory symptoms and lung function. Ozone is formed from nitric oxide and hydrocarbons (largely from traffic) in the presence of sunlight, and it penetrates indoors only if windows are opened. It has been linked to increased mortality in European studies,[14] but not in those from North America. This is probably because people open windows more often in Europe in the summertime than in North America, where many homes have air conditioning.

Several studies have linked proximity to busy roads and heavy goods vehicles (mostly with diesel engines) with respiratory problems.[15 16] This cannot be explained by concentrations of particulate matter (as this pollutant travels far) or ozone concentrations (which are lower near roads). In addition, evidence is emerging that carbon monoxide, even at low degrees of exposure, has an independent effect on admissions to hospital for cardiovascular disease[17] and mortality from this cause.[18] Car users have been shown to breathe more air pollutants than walkers, cyclists, or people using public transport on the same road.[19] The public health impact of air pollution on cancer is much smaller than the impact on respiratory and cardiovascular disease or all cause mortality. There is evidence of a link with lung cancer,[20] and an association between living near heavy traffic and other cancers has been suggested.[21]

Noise

About 65% of the population of the European Union is exposed regularly to sound levels (55-65 dB) that lead to serious annoyance, interference with speech, and sleep disturbance. This proportion has increased over the past decades.[22] Very loud noise (65 to 75 dB) is associated with a small increase in cardiovascular disease, which might have a large impact on the population in view of the wide exposure.[23] Furthermore, the attention, problem solving ability, and reading acquisition of children exposed regularly to aircraft noise are impaired. Noise also interferes with memory, attention, and the ability to deal with complex analytical problems.[24] Transportation is the main source of noise in Europe, and road traffic is the main source of human exposure to noise, except for people living near airports or railway lines.[25]



MICHEL FULLERAP PHOTO

Smog in Paris in October 1997

The health effects of noise are closely linked to the environments in which people function (such as schools, playgrounds, factories, homes); to sensitive time periods (for example, nights and weekends) and to locations that amplify the effects of noise (such as Alpine valleys or streets with high buildings). Strategies to prevent the health impacts of noise have to address these specific differences.

Psychosocial effects

Busy streets mean that children are discouraged from playing there or from walking or cycling to school. This hinders the development of independence and of social contacts and determines their attitude to the future use of cars and cycling.[26] Streets with heavy traffic have also been associated with fewer neighbourhood social support networks,[27] a factor that has been linked to various adverse health outcomes.[28] A large proportion of children and adults who have been involved in road traffic accidents have post-traumatic stress disorders afterwards.[29] Lead is still added to petrol in many European countries and can cause neurocognitive damage to children; leaded petrol should be phased out as soon as possible.

Trends in transportation

Movement of people and freight has increased dramatically in recent decades.[30] In the European Union in the 1990s, the greatest increases are reported for air transport (5.4% per year) and private cars (2.6%), while rail transport has declined (−0.4%). The average number of cars in the European Union is now approaching one for every two inhabitants.[31]

Reductions in cycling and walking have been reported in countries for which data are available. In the United Kingdom, cycling accounted for nearly 25% of all road traffic in 1951, but by 1994 this figure had fallen to just 1%.[1] The number of miles walked has also declined, on average, by 17% between 1975-6 and 1994. Increasing congestion and pollution, as well as the impact on health, show the importance of reversing these trends. Current policies that rely on road transport and stimulate mobility need to be reviewed.

Where now?

Although we know a lot about preventing the adverse health effects associated with different types of transport, the effectiveness of interventions thus far is limited. This is partly because these interventions often have consequences beyond the adverse impacts on health that they are designed to reduce. For example, the legal requirement to use cycle helmets in Australia reduced the number of head injuries, but it also reduced the number of cyclists to the point that a net health loss is expected.[32] Furthermore, the consequences to the environment are often overlooked in evaluating interventions that promote health. Some measures to reduce traffic accidents, for example, increase air pollution and may therefore be unacceptable.[33]

Technology has led to major reductions in the emission of air pollutants and noise from motor cars, and further gains are expected on emissions from heavy goods vehicles, which are still major air polluters. However, the enormous increase in the number of motor vehicles poses a major challenge that is unlikely to be met by technological development alone.[34] Noise pollution is now highly dependent on the volume of vehicles on the road—except for train and airport noise which are localised problems. Furthermore, very effective technologies for accident prevention such as speed reduction through road design (15-85% effective) or widespread use of speed cameras (50% effective) are not enforced as strictly as necessary.

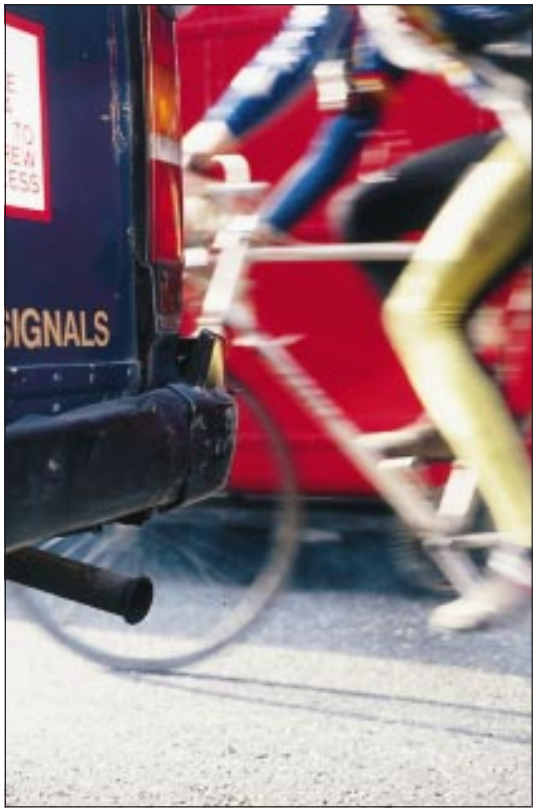
Technological solutions may create their own dilemmas. For example, newly developed diesel engines with lower CO_2 emissions produce many ultrafine particles, which, it is now suggested, are the real cause of the adverse health effects of particulate matter.[35] Another example is that of interventions that are effective at first in reducing injuries, but lead to a feeling of security and the taking of greater risks.

When assessing public health promotion policies and interventions, all the health consequences should be considered[36]; we should be more interested in overall health gain than in reducing a particular statistic. Those interventions which show synergies with environmental protection should be given priority.

Transport strategies that reduce exposure to air and noise pollution, reduce the risk of accidents, and increase levels of daily physical activity are likely to involve the following: discouraging the use of cars and heavy goods vehicles in cities; creating dedicated urban space for walking, cycling, and public transport; and limiting urban sprawl.[37]

Why the hesitation?

The current burden of transport policies on health is higher than it should be given the present knowledge of interventions and the availability of current technologies, many of which are simply not used. Part of the reason is a failure to consider fully the health consequences and related costs of individual travel choices and of governmental policies that have implications for transport and mobility. Health professionals have an essential role in advising individual patients and stakeholders. They will need to become involved in implementing health impact assessments and in evaluating the health costs of transport projects and strategies, taking account of the values and priorities of the communities affected. They also need to identify gaps in knowledge and carry out research into the health effects of transport which have not yet been clarified—for example, noise and the size of particles. Wider access to information should facilitate community involvement, and incorporating health costs into the decision making processes of transport and land use planning should be a powerful tool in promoting public health.



DAVID TOWNEND/ENVIRONMENTAL IMAGES

Cycling as a means of transport has decreased dramatically

Competing interest: None declared.

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Food production and food safety

T A B Sanders

Most food is now produced by large farms, processed industrially, and sold in supermarkets and multinational food outlets. Modern food production has reduced the cost and increased the variety of food available, but this centralisation of the food supply presents an opportunity for foodborne pathogens and toxins to infect and poison large numbers of consumers.[1] Furthermore, the globalisation of food trade means that food can become contaminated in one country and cause outbreaks of foodborne illness in another.[2–4] Modern food production is so complex that a systematic approach is needed to identify the hazards at each point in the food chain.

Summary points

- The centralisation and globalisation of foods increase the likelihood of pandemics of foodborne disease
- People in developing countries are at greater risk from naturally occurring toxicants, foodborne disease, and contaminants in the food chain
- The hazard critical control point concept is essential for assessing and managing risk
- Special consideration is needed with regard to fish and shellfish
- Concerted action needs to be taken to prohibit the use of antibiotics as growth promoters in animal production
- Internationally agreed food standards are essential to facilitate trade in food between areas with food surplus and those with food deficit

Methods

I made an electronic search of the Medline database between January 1990 and May 1999, using the search terms food poisoning *and* epidemiology, food additives *and* adverse effects, pesticides *and* poisoning, and food contamination. Statistical information on the incidence of food poisoning and adverse reactions was obtained from the Public Health Laboratory Services; Centers for Disease Control and Prevention, Atlanta; and the UK Department of Health. Data on food surveillance was obtained from the Ministry of Agriculture, Fisheries, and Food. Information on risk assessment was derived from working papers of the WHO/FAO Codex Alimentarius Commission and the European Commission Scientific Committee for Food.

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